NIST-772
(REV. 1048)

U.S. DEPARTMENT OF COMMERCE
NATIONAL INSTITLITE OF STANDARDS AND TECHNOLOGY

CHANGE NUMBER
1

DATE OF CHANGE
1993 October 4

FIPS PUBLICATION NUMBER
127-2

FIPS PUBLICATION CHANGE NOTICE

PUBLICATION TITLE

FIPS PUB 127-2, Database Language (SQL).

THIS OFFICE HAS A RECORD OF YOUR INTEREST IN RECEIVING CHANGES TO THE ABOVE FIPS PUBLICATION. THE CHANGE(S) INDICATED BELOW HAVE BEEN PROVIDED BY THE MAINTENANCE AGENCY FOR THIS PUBLICATION AND WILL BE INCLUDED IN ThE NEXT PUBLISHED REVISION TO THIS FIPS PUBLICATION. QUESTIONS OR REQUESTS FOR ADDITIONAL INFORMATION SHOULD BE ADDRESSED TO THE MAINTENANCE AGENCY:

National Institute of Standards
and Technology
Computer Systems Laboratory
Gaithersburg, MD 20899

CHANGE ITEM(S)

This change notice modifies Section 10 of FIPS PUB 127-2 to resolve an inconsistency in the specification of FIPS Transitional SCALE. The inconsistency is that <column name>s of length longer than 18 characters are not required to be supported by an implementation until conformance to FIPS Intermediate SCALE is specified in a procurement, but support for certain tables in the Information Schema having some column names longer than 18 characters is required if FIPS Transitional SCALE is specified. This is not a problem for the ISO/IEC or ANSI SQL specifications because the Information Schema is not required in those standards until Intermediate SQL is supported, and Intermediate SQL requires support for column names of up to 128 characters.

This inconsistency was discussed with the X3 Technical Committee that developed the ANSI SQL standard. The committee recommended that FIPS Transitional SQL requirements be modified to require support for the content of required Information Schema tables in a special FIPS schema different from the INFORMATION SCHEMA and having shortened column names. NIST will design the NIST SQL Test Suite for Transitional SQL to test for the existence of appropriate views in a special INFO_SCHEM schema.

The X3 committee also recommended that the following name shortening algorithm be used for consistency and convenience in being able to remember the shortened names. This change will apply to all column names in the INFO_SCHEM view definition for all information schema tables required by Transitional SQL.

DEFAULT	--->	DEF
CHARACTER	--->	CHAR

MAXIMUM	--->	MAX
PRECISION	--->	PREC
CATALOG	--->	CAT
SCHEMA	--->	SCHEM
NUMERIC	o-->	NUM

Applications that are designed to depend upon these shortened names may be ported to systems that support longer names or may outlive the 18 character name restriction on identifiers. Thus FIPS SQL will require that these special views in the INFO~SCHEM schema be supported by all implementations of FIPS Transitional SQL, including implementations that also support these tables in the INFORMATION_SCHEMA without difficulty.

This required feature of FIPS Transitional SQL is marked as a "deprecated" feature, which means that feature may not be supported in a future version of the standard, although it is a fully supported and required feature of the current standard.

ELECTRONIC FORM

FIPS PUB 127-2, SQL

Change Notice #1

1993 October 4

Application programs written to reference tables and columns in the INFO_SCHEM can be modified automatically to execute in any Intermediate SQL processing environment by substituting "INFORMATION_SCHEMA" for "INFO_SCHEM" in any schema reference and by expanding the seven shortened words identified above in any column reference that is explicitly or implicitly qualified by an INFO~SCHEM schema name.

A second alternative to support programs written to reference tables and columns in the INFO SCHEM in any Intermediate SQL processing environment is for the Database Administrator to define INFO_SCHEM directly as specified below. This alternative should add only a minimal runtime performance cost, and will avoid making changes to any individual application program.

Changes to Section 10 are attached.

FIPS PUB 127-2, SQL
Change Notice #1
1993 October 4

Add the following paragraphs to Section 10, "Specifications", of FIPS PUB 127-2:

For conformance to Transitional SQL, FIPS SQL requires that the implementation provide a
special schema, the INFO_SCHEM schema, as a system-owned schema in every catalog
supported by that implementation. This is a deprecated feature in FIPS 127-2. The
INFO_SCHEM schema has, effectively, the following schema definition:

```
  CREATE SCHEMA INFO SCHEM AUTHORIZATION "SYSTEM" DEFAULT CHARACTER
       SET SQL_TEXT

  CREATE VIEW SCHEMATA
     ( CAT NAME,
       SCHEM NAME,
       SCHEM-OWNER,
       DEF CHAR SET CAT,
       DEF-CHAR-SET-SCHEM,
       DEF-CHAR-SET-NAME

     AS SELECT
       CATALOG_NAME SCHEMA_NAME SCHEMA_OWNER
       DEFAULT CHARACTER SET CATALOG,
       DEFAULT-CHARACTER-SET-SCHEMA,
       DEFAULT-CHARACTER-SET-NAME
     FROM INFORMATION_SCHEMA-SCHEMATA

  CREATE VIEW TABLES
       TABLE CAT,
       TABLE-SCHEM,
       TABLE-NAME,
       TABLE-TYPE

     AS SELECT
       TABLE CATALOG, TABLE SCHEMA, TABLE_NAME, TABLE_TYPE FROM
     INFORMATION_SCHEMA.TABLES

  CREATE VIEW VIEWS
       TABLE CAT,
       TABLE-SCHEM,
       TABLE-NAME,
       VIEW DEFINITION,
```

```
      CHECK OPTION,
      IS_UPDATABLE

    AS SELECT
      TABLE CATALOG, TABLE SCHEMA, TABLE_NAME, VIEW_DEFINITION,
      CHECK~OPTION, IS UPDATABLE
    FROM INFORMATION-SCHEMA VIEWS

  CREATE VIEW COLUMNS
      TABLE CAT,
      TABLE-SCHEM,
      TABLE-NAME,
      COLUMN_NAME
```



```
    ORDINAL_POSITION,
    COLUMN_DEF
    IS_NULLABLE,
    DATA_TYPE,
    CHAR_MAX LENGTH,
    CHAR_OCTET_LENGTH,
    NUM_PREC,
    NUM_PREC_RADIX,
    NUM_SCALE,
    DATETIME_PREC,
    INTERVAL_CODE,
    INTERVAL_PREC,
    CHAR_SET_CAT,
    CHAR_SET_SCHEM,
    CHAR_SET_NAME,
    COLLATION_CAT,
    COLLATION_CHEM,
    COLLATION_NAME,
    DOMAIN_CAT,
    DOMAIN_CHEM,
    DOMAIN_NAME

    AS SELECT
    TABLE CATALOG, TABLE_SCHEMA, TABLE_NAME COLUMN_NAME,
    ORDINAL_POSITION, COLUMN_DEFAULT, IS_NULLABLE, DATA_TYPE,
    CHARACTER_MAXIMUM_LENGTH, CHARACTER_ OCTET_LENGTH,
    NUMERIC_PR_ECISION, NUMERIC_PRECISION_RADIX NUMERIC_SCALE,
    DATETIME_PRECISION, INTERVAL_CODE, INTERVAL_PRECISION,
    CHARACTER_SET_CATALOG, CHARACTR_SET_SCHEMA, CHARACTER_SET_NAME,
    COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME,
```

```
     DOMAIN_CATALOG, DOMAIN_SCHEMA, DOMAIN_NAME FROM
     INFORMATION_SCHEMA.COLUMNS

  CREATE VIEW TABLE_PRIVILEGES
       (GRANTOR,
       GRANTEE,
       TABLE_CAT,
     TABLE_SCHEM,
     TABLE_NAME,
       PRIVILEGE_TYPE,
       IS_GRANTABLE
)
    AS SELECT
     GRANTOR, GRANTEE, TABLE_CATALOG, TABLE_SCHEMA, TABLE_NAME,
     PRIVILEGE_TYPE, IS_GRANTABLE
    FROM INFORMATION_SCHEMA.TABLE_PRIVILEGES

  CREATE VIEW COLUMN_PRIVILEGES
    ( GRANTOR,
     GRANTEE,
       TABLE_CAT,
       TABLE_SCHEM,
     TABLE_NAME,
       COLUMN_NAME,
       PRIVILEGE_TYPE,
     IS_GRANTABLE

)    AS SELECT
```



```
     GRANTOR, GRANTEE, TABLE_CATALOG, TABLE_SCHEMA, TABLE_NAME,
     COLUMN_NAME, PRIVILEGE_TYPE, IS_GRANTAIWE
     FROM INFORMATION_SCHEMA.COLUMN_PRIVILEGES

  CREATE VIEW USAGE_PRIVILEGES
     GRANTOR,
     GRANTEE,
     OBJECT_CAT,
     OBJECT_SCHEM,
     OBJECT_NAME
     OBJECT TYPE,
     PRIVILEGE TYPE,
     IS_GRANTABLE

)    AS SELECT
```

GRANTOR, GRANTEE, OBJECT CATALOG, OBJECT_SCHEMA, OBJECT_NAME, OBJECT TYPE, PRIVILEGE_TYPE IS GRANTABLE
FROM INFORMATION_SCHEMA.USAGE_PRIVILEGES

GRANT SELECT, REFERENCES ON SCHEMATA TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON TABLES TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON VIEWS TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON COLUMNS TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON TABLE_PRIVILEGES TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON COLUMN_PRIVILEGES TO PUBLIC WITH GRANT OPTION GRANT SELECT, REFERENCES ON USAGE_PRIVILEGES TO PUBLIC WITH GRANT OPTION

Note: The COLUMNS view defined above anticipates an SQL Amendment that is currently being processed by ANSI/X3. That SQL correction, when finally approved, will add the INTERVAL_CODE and INTERVAL_PRECISION columns to the COLUMNS view in the INFORMATION_SCHEMA. These two columns were mistakenly omitted from ANSI X3.135-1992 as originally published.

National Institute of Standards and Technology
Docket No. [920772-3048]

RIN 0693-AB05

Approval of Federal Information

Processing Standards Publication 127-2 Database Language SQL

AGENCY: National Institute of Standards and Technology (NIST), Commerce.

ACTION: The purpose of this notice is to announce that the Secretary of Commerce has approved a revision of Federal Information Processing Standard 127-1. Database Language SQL, which will be published as FIPS Publication 127-2. This publication announces adoption of American National Standard Database Language SQL, ANSI X3.135-1992, as the Federal Information Processing Standard for Database Language SQL (FIPS SQL). This revised standard supersedes FIPS 127-1 in its entirety.

Federal

SUMMARY: On September 9, 1992, notice was published in the Federal Register (57 FR 41126) that a revision of Federal Information Processing Standard 127-1, Database Language SQL, was being proposed for Federal use.

The written comments submitted by interested parties and other material available to the Department relevant to this standard were reviewed by NIST On the basis of this review. NIST recommended that the Secretary approve the standard as a Federal Information Processing Standard (FIPS), and prepared a detailed justification document for the Secretary's review in support of that recommendation.

The detailed justification document which was presented to the Secretary is part of the public record and is available for inspection and copying in the Department's Central Reference and Records Inspection Facility, room 6020,

Herbert C. Hoover Building, 14th Street between Pennsylvania and Constitution Avenues, N.W. Washington, DC 20230.

This FIPS contains two sections: (1) An announcement section, which provides information concerning the applicability, implementation, and maintenance of the standard; and (2) a

specifications section, which deals with

the technical requirements of the standard. Only the announcement section of the standard is provided in this notice

EFFECTIVE DATE: This standard is effective December 3, 1993.

ADDRESSES:. Interested parties may purchase copies of this revised standard, including the technical specifications portion, from the National Technical Information Service (NTIS). Specific ordering information from NTIS for this standard is set out in the Where to Obtain Copies Section of the announcement portion of the standard.

FOR FURTHER INFORMATION CONTACT: Dr. Leonard Gallagher, National Institute of Standards end Technology, Gaithersburg, MD 20899, telephone (301) 975-3251.

Dated: May 26. 1993

Raymond G. Kammer,
Acting Director.
Federal Information Processing

Standards Publication 127-2
June 2, 1993.
Announcing the Standard for Database

Language SQL

Federal Information Processing Standards Publications (FIPS PUBS) are issued by the National Institute of Standards and Technology after approval by the Secretary of Commerce pursuant to section 111(d) of the

Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235.

1. Name of Standard. Database

Language SQL (FIPS PUB 127-2).

2. Category of Standard. software Standard, Database.

3. Explanation. This publication is a revision of FIPS PUB 127-1 and supersedes that document in its entirety. It provides a substantial, upward-compatible enhancement of Database Language SQL. It includes four levels of conformance: Entry SQL, Transitional/SQL, Intermediate SQL, and Full SQL Entry SQL is a minor enhancement over the minimum requirements of FIPS PUB 127-1, Intermediate SQL is a major enhancement over Entry SQL, and Full SQL is a major enhancement over

Intermediate SQL. Transitional SQL is a temporary FIPS specification that falls approximately half way between Entry SQL and Intermediate SQL. Conformance to Entry SQL is required in all Federal procurement of SQL products. Conformance to Transitional SQL, Intermediate SQL or Full SQL are

options that may be specified, in a Federal

explicitly, as requirements in a Federal procurement. Section 13 identifies the minimum requirements for conformance to Entry SQL in FIPS PUB 127-2 that differ from the minimum requirements for conformance to FIPS PUB 127-1, and Section 14 defines requirements for the three additional levels of conformance.

This publication announces adoption of American National Standard Database

Language SQL, ANSI X3.135-1992, as the Federal Information Processing Standard for Database Language SQL (FIPS SQL). The exact specification is in Section 10 of this standand.

ANSI SQL is a revision and replacement of two previous American National Standards, ANSI X3.135-1989 and ANSI X3.168-1989. It specifies the syntax end semantics of SQL language facilities for defining and accessing SQL databases. These facilities include:

-Schema definition, to declare the structures, integrity constraints, and access privileges of a database.
-Schema manipulation, to alter a schema definition.
-Data manipulation, to populate a database and access SQL-data.
-Transaction management, to define and manage SQL-transactions.
-Connection management, to establish and manage SQL-connections.
-Session management, to set the attributes of an SQL-session.
-Dynamic SQL, to provide facilities for dynamic construction and execution of SQL statements.
-Diagnostics management, to communicate constraint violations and warnings to applications.

Information schema tables, to provide an SQL description of schema definitions.

-Programming language bindings, to declare database procedures that may be called from various programming languages.

-Embedded SQL, to define how SQL statements may be syntactically embedded into one of the following programming languages: Ada. C,

COBOL, FORTRAN, MUMPS, Pascal, or PL/I. Embedded SQL was formerly defined in ANSI X3.168-1989.

ANSI SQL is specified in three levels: Entry SQL, Intermediate SQL, end Full SQL. Entry SQL is a minor enhancement of ANSI X3.136-1989 (see Section 13). Intermediate SQL adds provisions for schema manipulation, dynamic SQL, diagnostics management, long identifiers, multiple module support, cascade delete for referential integrity, multiple, schemas per authorization identifier, DATE and TIME date types. domains, variable length character strings, support for national character sets, and substantial enhancements for data manipulation. The data manipulation enhancements in Intermediate SQL Include: a CASE expression, CAST functions between data types, string operations, natural join, outer join, union join, row value expressions, and sudqueries in value expressions, as well as table operations for union, intersection, and complement. Full SQL adds provisions for connection management, session management, pre-defined character translations end form-of-use conversions, a BIT string data type, deferrable integrity constraints, derived tables in the FROM clause, subqueries in CHECK clauses, insensitive cursors, self-referencing data operations, assertions, end temporary tables. A list of optional FIPS SQL features, comprising all of the additional facilities in ANSI Intermediate SQL and Full SQL, is defined in Section 14 of this standard.

The purpose of FIPS SQL is to promote portability and interopability of database application programs, to facilitate maintenance of database systems among heterogeneous data processing environments, and to allow for the efficient exchange of programmers among different data management projects. The standard is used by implementors as the reference authority in developing a FIPS conforming relational model database management system, with standard programming language interfaces to that database management system. The standard is used by application programmers to help write SQL conforming applications and by other computer professionals who need to know the precise syntactic and semantic rules of Database Language SQL.

4. Approving Authority. Secretary of Commerce.

5. Maintenance Agency. Department of Commerce, National Institute of Standards and Technology (Computer Systems Laboratory)

6. Cross Index.

a. American National Standard Database Language SQL-, ANSI X3.135-1992 (revision of ANSI X3.135-1989 and replacement of ANSI X3.168-989).

b. ISO/IEC 9075:1992, Database Language SQL (revision of ISO/IEC 9075:1989).

Note: Except for a different Foreword, Introduction, and Normative references, are identical documents.

7. Related Documents.

a. Federal Information Resources Management Regulations (FIRMR) subpart 201.20.303, Standards, and subpart 201.39.1002, Federal Standards, April 1992.

b. Federal ADP and Telecommunication Standards Index, U.S. General Services Administration, Information Resources Management Service, October 1992 (updated periodically).

c. NIST, Validated Products List:/ Programming Languages, Database Language SQL, Graphics, GOSIP, POSIX, Security; Judy B. Kailey, Editor, NISTIR 5103, issue No. 1, January 1993 (republished quarterly). Available by subscription from the National Technical Information Service (NTIS).

d. FIPS PUB 21-3, Programming Language COBOL, 1990.

e. FIPS PUB 69-1, Programming Language FORTRAN, 1985.

f. FIPS PUB 109, Programming Language Pascal, 1985.

g. FIPS PUB 119, Programming Language Ada, 1985.

h. FIPS PUB 125-1, Programming Language MUMPS, 1993.

I. FIPS PUB 160, Programming Language C, 1991.

j. FIPS PUB 146, Government Open Systems Interconnection Profile (GOSIP). A revision to FIPS PUB 146-1. including Remote Database Access (RDA) specifications, is planned for mid-1993. To be issued in conjunction with IGOSS.

k. IGOSS, Industry/Government Open Systems Specification, publication planned mid-1993. This specification will reference "stable agreements" from the NIST OSI Implementor's Workshop as of December 1992.

l. NIST SP 500-206, Stable Implementation Agreements for Open Systems Interconnection Protocols, Version 6. Edition 1, NIST Workshop for Implementors of Open Systems Interconnection, December 1992.

m. ISO/IEC 9579-1, Information Technology-Open Systems Interconnection Remote Database Access---Part 1: Generic model, service, and protocol, document ISO/IEC JTC1/SC21 N7689, April 1993.

n. ISO/IEC 9579-2, Information Technology-Open Systems Interconnection-Remote Database Access-Part 2: SQL specialization, document ISO/IEC JTC1/SC21 N7703, April 1993.

o. ISO/IEC 10026, Information Technology-Open Systems Interconnection-Distributed Transaction Processing Part 1:OSI TP Model, Part 2: OSI TP Service, Part 3: OSI TP Protocol Specification, International Standard, December 1992.

p. SQL Information Bulletin, Number 1, SQLIB-1. Interpretations of ANSI X3.135-1989, available from Global Engineering Documents, April 1991.

q. FIPS PUB 29-2, Interpretation Procedures for FIPS Software, 14 September 1987.

r. ISO 646, Information Processing-ISO 7-bit coded character set for information interchange, 2nd edition, Third Edition, December 1991.

s. ISO 4873, Information Processing ISO 8-bit code for information

interchange-Structure and rules for implementation, Third Edition, 1991. Replaces ANSI X3.134.1, 8-bit ASCII.

t. ANSI/ISO 8859-1, Information processing-8-bit single-byte coded graphic character sets-Part 1: Latin alphabet No. 1, February 1987. Replaces ANSI X3.134.2 effective September 22, 1992.

u. ISO/IEC CD 11404, Information Technology-Programming Languages-Language Independent Data Types (CUD), document JTC1/SC22 N1305, December 1992.

8. Objectives. The FIPS for Database Language SQL permits Federal departments and agencies to exercise more effective control over the production, management, and use of the Government's information resources. The primary objectives are:

-To encourage more effective utilization and management of database application programmers by ensuring that skills acquired on one project are transportable to other projects, thereby reducing the cost of database programmer retraining.

-To reduce overall software costs by making it easier and less expensive to maintain database definitions and database application programs and to transfer those definitions and programs among different computers and database management systems, including replacement database management systems.

-To promote communication and interoperability among data installations conforming to FIPS SQL and related GOSIP communications standards.

-To reduce the cost of software development by achieving increased database application programmer productivity through the understanding and use of database methods employing standard structures and operations, standard data types, standard constraints, and standard interfaces to programming languages.

-To protect the software assets of the Federal government by ensuring to the maximal feasible extent that Federal database management system standards are technically sound and that subsequent revisions are compatible with the installed base.

Government-wide attainment of the above objectives depends upon the widespread availability and use of comprehensive and precise standard database management system specifications.

9. Applicability.

9.1 Database Language SQL is one of the database language standards provided for use by all Federal departments and agencies. These database language standards should be used for all computer database applications and programs that are either developed or acquired for government use. FIPS SQL is particularly well suited for use in database applications that employ the relational data model. The relational data model is appropriate for applications requiring flexibility in the data structures and access paths of the database. The relational data model is desirable where there is a substantial need for ad hoc data manipulation, and data restructuring, in addition to the need for access by static applications under production control.

9.2 FIPS SQL shall be used for relational database applications and programs when one or more of the following situations exist:

-It is anticipated that the life of the database application will be longer than the life of the presently utilized equipment or database management system, if any.

-The database application is under constant review for updating of the specifications, and changes may result frequently.

-The database application is being designed and developed centrally for a decentralized system that employs computers of different makes and, models or database software acquired from a different vendor.

-The database application will or might be run under a database management system other than that, for which the database application is initially written.

-The database application is to be understood and maintained by programmers other than the original ones.

-The database application is one part of a distributed application that requires exchange of data or interoperation of the various parts.

-The database application is or is likely to be used by organizations outside the Federal government (e.g., Federal government contractors, State and local governments, and others).

9.3 Nonstandard language features shall be used only when the needed operation or function cannot reasonably be implemented with the standard features alone. A needed language feature not provided by the FIPS database languages should, to the extent possible, be acquired as part of an otherwise FIPS conforming database management system. Although nonstandard language features can be very useful, it should be recognized that their use may make the interchange of programs and future conversion to a revised standard or replacement database management system more difficult and costly.

9.4 Although this standard does not specifically address interactive database access through graphical user interfaces (GUI), the SQL, statements specified by this standard are appropriate for such use. In a Client/Server environment. a GUI client may use SQL, statements to access SQL conformant server databases.

9.5 Although this standard does not specifically address distributed database management systems on distributed database applications, the connection management statements defined in this standard may be used, along with facilities for remote database access (ISO/IEC 9579) and distributed transaction processing (ISO/IEC 10026), to access SQL-data at remote nodes in a distributed system and to present a global view to application programs.

9.6 Although this standard does not specifically address user-defined data types, class hierarchies, inheritance, polymorphism, or other features of object database management system, such capabilities are upward compatible extensions of this standard and may be specified in a future revision of FIPS programs SQL (see Section 16.8).

9.7 It is recognized that some programmatic requirements may be more economically and efficiently satisfied through the use of a database management system employing a different data model than those provided by the FIPS database languages or the use of a database management system that functionally conforms to a FIPS database language but does not conform to all other aspects of the FIPS. The use of any facility should be considered in the context of system life, system cost, data integrity, and the potential for data sharing.

9.8 Some programmatic requirements may be more economically and efficiently satisfied by the use of automatic program generators or by database access through other high-level language information processing systems. However, if the final output of a program generator or high-level language system is language that accesses a relational database, then that language shall conform to the conditions and specifications of SQL.

10. Specifications. FIPS SQL, adopts all provisions of ANSI X3.135-1992, Database Language SQL, with the exceptions listed below:

a . FIPS SQL requires conformance to Entry SQL, Conformance to Transitional SQL, Intermediate SQL, or full SQL are

options that may be specified explicitly in SQL procurements (see Section 14).
b. FIPS SQL does not include PL/I language bindings, since PL/I is not a FIPS programming language.
c. FIPS SQL does not recognize conformance solely by "direct invocation and processing of SQL language" as specified in Subclause 23.2 of ANSI X3.135-1992, because direct invocation does not mandate all of the facilities desired in a FIPS SQL conforming product. Conformance to FIPS SQL requires a Module or Embedded SQL binding style to one or more FIPS programming languages.
d. FIPS SQL, requires that the "SQL Flagger" be implemented in Entry SQL for in addition to Intermediate SQL and Full SQL. This is because FIPS SQL has always included a flagger requirement, even from its first specification in 1987.

For conformance to Entry SQL or Transitional SQL, FIPS SQL requires "Entry SQL Flagging" with the "Syntax Only" extent of checking option as defined in Subclause 4.33 of ANSI X3.135-1992. The SQL, Flagger is required for each language binding style, including "Interactive Direct SQL" (see Section 16.5).
e. For conformance to Intermediate

SQL or to Full SQL, FIPS SQL requires implementation of the following named character sets: SQL_CHARACTER, ASCII_GRAPHIC. LATIN1, ASCII_FULL, and SQL_TEXT. The form-of-use-and default collation requirements for these character sets are defined in Section 16.7 of this standard.
f. For conformance to Intermediate SQL or to Full SQL, FIPS SQL requires implementation of the FIPS_DOCUMENTATION schema, as specified in Section 15 of this standard.
Implementations. Implementation of this standard involves four areas of consideration: the effective data, acquisition of FIPS SQL
Implementations, interpretation of FIPS of
SQL, and validation of FIPS SQL implementations.
11.1 Effective Date. This publication is effective December 3, 1993. Prior to that date the requirements of FIPS PUB

127-1 apply to Federal SQL

procurements. This delayed effective above date is intended to give implementations that conform to FlIPS PUB 127-1 time to make the enhancements necessary to enable conformance to Entry SQL (see Section 13). No further transitional period is necessary.

11.2 Acquisition of SQL Implementation- Relational model database management systems acquired

for Federal use shall implement ,FIPS

required whether SQL Implementations are developed internally, acquired as part of an ADP system procurement, acquired by separate procurement, used under an ADP leasing arrangement, or specified for use in contracts for programming services. Recommended terminology for procurement of FIPS SQL is contained in the U.S. General Services Administration publication Federal ADP & Telecommunications Standards Index, Chapter 4 Part 1.
11.3 Interpretation of FIPS SQL. NIST provides for the resolution of questions regarding FIPS SQL specifications and requirements, and issues official interpretations as needed. Procedures interpretations are specified in FIPS PUB 29-2. All questions about the interpretation of FIPS SQL should be addressed to: Director, Computer

4.0 of the test suite will be available in Language SQL Interpretation, National Institute of Standards and Technology, Gaithersburg, MD 20899, Telephone: (301) 975-2833.
11.4 Validation of SQL Implementations. Implementations of FIPS SQL shall be validated in accordance with NIST Computer Systems Laboratory (CSL) validation procedures for FIPS SQL.

Each release of the test suite has Recommended procurement terminology for validation of FIPS SQL is contained in the U.S. General Services Administration publication Federal ADP & Telecommunications Standards Index, Chapter 4 part 2. This GSA publication provides terminology for three validation options: Delayed Validation, Prior Validation Testing, and Prior Validation. The agency shall select the appropriate validation option and shall specify whether a Validation Summary Report or Certificate of Validation is required. The agency shall specify appropriate time frames for validation and correction of nonconformities. The agency is advised to refer to the NIST publication

Validated Products List for Information about the validation status of SQL products. This information may be used to specify validation time frames that are not unduly restrictive of requirement of FIPS, 127-1. competition.
An SQL Test Suite license includes The agency shall specify the criteria used to determine whether a Validation Summary Report (VSR) or Certificate is applicable to the hardware/software environment of the SQL implementation offered. The criteria for applicability of a VSR or Certificate should be appropriate to the size and timing of the

procurement. A large procurement may require that the offered version/release of the SQL implementation shall be
Current information about the NIST validated in a specified hardware/

validation shall be conducted with specified hardware/software features or parameter settings; e.g. the same parameter settings to be used in a performance benchmark. An agency with a single-license procurement may review the Validated Products List to determine the applicability of existing VSRs or Certificates to the agency's hardware/software environment. Implementations shall be evaluated using the NIST SQL Test Suite, a suite of automated validation tests for SQL implementations. The NIST SQL Test Suite was first released in August 1988 to help users and vendors determine compliance with FIPS SQL. Version 3.0 of the test suite was released in January 1992, to be used for validating conformance to FIPS PUB 127-1 after July 1, 1992. It is expected that Version Systems Laboratory, ATTN: Database

mid-1993, to be used for testing conformance to Entry SQL of FIPS PUB 127-2 after the effective date. The results of validation testing by the SQL Testing Service are published on a quarterly basis in the Validated Products List, available from the National Technical Information Service (NTIS).

provided additional interfaces and test cases to increase the test suite's coverage of the SQL language. Version 3.0 of the NIST SQL Test Suite provides 11 test suite types (interfaces): Embedded (pre-processor) Ada, Embedded C, Embedded COBOL, Embedded FORTRAN, Embedded Pascal, module language Ada, module language C, module language COBOL, module language FORTRAN, module language Pascal, and Interactive Direct SQL. Version 3.0 does not include tests for Embedded MUMPS or module language MUMPS because the MUMPS programming language Interface is not defined in FIPS 127-1; such tests may be available in version 4.0, for testing

FIPS 127-2. There are additional tests in Version 3.0 for the Integrity Enhancement Feature, default database sizing constructs, and the FIPS Flagger

all of the tests described documentation, and automatic notifications of approved changes to the SQL Test Suite for a six month period. A license for SQL Test Suite Version 3.0 is a necessary requirement for an organization that wishes to be tested by the NIST SQL Testing Service between

July 1, 1992 and the effective date of FIPS 127-2.

SQL Validation Service and Validation

SQL Conformance to FIPS SQL is software environment and that the procedures for FIPS SQL is available

from: National Institute of Standards and Technology, Computer Systems Laboratory, Software Standards Validation Group, Building 225, room A266, Gaithersburg, Maryland 20899, (301) 975-2490.

12. Waivers. Under certain exceptional circumstances, the heads of Federal departments and agencies may approve waivers to Federal Information Processing Standards (FIPS). The head of such agency may redelegate such authority only to a senior official designated pursuant to section 3506(b) of title 44, U.S. Code. Waivers shall be granted only when:

a. Compliance with a standard would adversely affect the accomplishment of the mission of an operator of a Federal computer system, or

b. Cause a major adverse financial impact on the operator which is not offset by Government/wide savings.

Agency heads may act upon a written waiver request containing the information detailed above. Agency heads may also act without a written waiver request when they determine that conditions for meeting the standard cannot be met. Agency heads may approve waivers only by a written decision which explains the basis on which the agency head made the required finding(s). A copy of each such decision, with procurement sensitive or classified portions clearly identified, shall be sent to: National Institute of Standards and Technology; ATTN: FIPS Waiver Decisions, Technology Building, room B-154; Gaithersburg, MD 20899.

In addition, notice of each waiver granted and each delegation of authority to approve waivers shall be sent promptly to the Committee on Government Operations of the House of Representatives and the Committee on Governmental Affairs of the Senate and shall be published promptly in the Federal Register.

When the determination on a waiver applies to the procurement of equipment and/or services, a notice of the waiver determination must be published in the Commerce Business Daily as a part of the notice of solicitation for offers of an acquisition or, if the waiver determination is made after that notice is published, by amendment to such notice.

A copy of the waiver, any supporting documents, the document approving the waiver and any supporting and accompanying documents, with such deletions as the agency is authorized and decides to make under 5 U.S.C. 552(b), shall be part of the procurement documentation and retained by the agency.

(Section 13 through Section 16 of FIPS PUB 127-2 are not included in this announcement).

17. Where to Obtain Copies. Copies of this publication are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161, telephone 703 487-4650. (Sale of the included specification document, ANSI X3.135-1992, is by arrangement with the American National Standards Institute.) When ordering, refer to Federal Information Processing Standards Publication 127-2 (FIPS PUB 127-2). Database Language SQL. Payment may be made by check, money order, or deposit account.

[FR Doc. 93-12918 Filed 6-1-93; 8:45 am]
BILLING CODE 351o-CN-M

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards and Technology

FIPS PUB 127-2
FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

DATABASE LANGUAGE SQL

CATEGORY: SOFTWARE STANDARDS
SUBCATEGORY: DATABASE

1993 JUNE 2

FIPS PUB 127-2

FIPS PUB 127-2

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION
(Supersedes FIPS PUB 127-11990 February 2)

DATABASE LANGUAGE SQL

Category:Software Standard Subcategory:Database

Computer Systems Laboratory
National Institute of Standards and Technology

Gaithersburg, MD 20899

Issued June 2, 1993

U.S. Department of Commerce
Ronald H. Brown, Secretary
National Institute of Standards
and Technology
Arati Prabhakar, Director

Foreword

The Federal Information Processing Standards Publication Series of the National Institute of Standards and Technology (NIST) is the official publication relating to standards and guidelines adopted and promulgated under the provisions of Section 111(d) of the Federal Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235. These mandates have given the Secretary of Commerce and NIST important responsibilities for improving the utilization and management of computer and related telecommunications systems in the Federal Government. The NIST, through its Computer Systems Laboratory, provides leadership, technical guidance, and coordination of Government efforts in the development of standards and guidelines in these areas.

Comments concerning Federal Information Processing Standards Publications are welcomed and should be addressed to the Director, Computer Systems Laboratory, National Institute of Standards and Technology, Gaithersburg, MD 20899.

James H. Burrows, Director
Computer Systems Laboratory

Abstract

This publication announces adoption of American National Standard Database Language SQL, ANSI X3.135-1992, as the Federal Information Processing Standard for Database Language SQL (FIPS SQL). It is a revision of FIPS PUB 127-1 that adds extensive new functionality to the SQL language. Conformance to FIPS SQL is mandatory for all Federal procurements of relational model database management systems. FIPS SQL is specified to have four conformance levels: Entry SQL, Transitional SQL, Intermediate SQL, and Full SQL. Although only Entry SQL is required for conformance to FIPS SQL, the other conformance levels may be specified as mandatory
requirements in individual procurements. FIPS SQL also provides default sizing parameters and limits for SQL constructs to provide a common baseline for database interoperability.
The purpose of FIPS SQL is to promote portability and interoperability of database application programs, to facilitate maintenance of database systems among heterogeneous data processing environments, and to allow for the efficient exchange of programmers among different data management projects.

Key words:ANSI standard; data manipulation language; database; database language standard; Embedded SQL; Federal Information Processing Standard (FIPS); ISO standard; module language; schema definition language; software; Structured Query Language (SQL).

National Institute of Standards and Technology

FIPS PUB 127-2

32 pages (June 2, 1993)

U.S. Government Printing Office
For sale by the
Washington: 1993

National Technical
Information Service
U.S. Department of Commerce Springfield,
VA
22161

CODEN:FIPPAT